REMARKS/ARGUMENTS

Claims 1-12 and 21-24 are pending.

Claims 1, 4, 5, 8-10, and 12

Claims 1, 4, 5, 8-10, and 12 stand rejected under 35 U.S.C. § 102(a) as being unpatentable over Japanese patent application Pub. No. 08-097188 A (Yoshida et al.) in view of Sanders et al. (US 5,120,930) and Vella (US 6,545,419).

Applicant respectfully submits that independent claim 1 is patentable over Yoshida et al., Sanders et al., and Vella because, for instance, they do not teach or suggest a heat shield for shielding a nozzle extending into a chamber to introduce a process gas into the chamber through a nozzle opening wherein the heat shield is spaced from the nozzle by a gap, and the gap between the heat shield and the nozzle is smaller than a thickness of the heat shield. This is described, for instance, in paragraph [33].

In contrast, the heat shield of Yoshida et al. is disposed so that the gap between the heat shield and the nozzle is significantly larger than the thickness of the heat shield. The design of the heat shield disclosed by Yoshida et al. is disadvantageous in that it occupies a larger volume within the limited confines of a semiconductor processing chamber, which can impede the processing of substrates due to spatial limitations. Furthermore, the larger volume occupied by the heat shield disclosed by Yoshida et al. causes poor heat dispersion by the heat shield in that the shield is closer to the substrate and the plasma formed within the chamber.

Sanders et al. discloses a plasma arc torch 10 with improved nozzle shield and step flow. The nozzle shield 38 is mounted at the lower end of the plasma arc cutting torch adjacent a workpiece to block splattered molten metal from reaching a nozzle 16 of the torch. The shield 38 is spaced from the cap flange 20a and the nozzle 16 to define a gas flow passage 40, which allows gas flow to cool the shield 38 to a degree that inhibits the adherence of ejected molten metal. See Abstract; and column 6, lines 14-16 and 31-35.

Vella discloses a double chamber ion implantation system, in which a heat shield is positioned between the charge exchange chamber and the plasma generating chamber to reduce the temperature of the wall between the chambers thereby reducing thermal consumption of fuel introduced into the charge exchange chamber for ionization. See column 7, lines 39-44.

Applicant respectfully submits that Yoshida et al., Sanders et al., and Vella are non-analogous art. Sanders et al. and Vella are outside the field of Applicants' endeavor and are not reasonably pertinent to the particular problem that the inventors addressed. To determine if a reference may be properly relied upon to make out a prima facie case of obviousness, the inquiry is two-fold. The first inquiry is whether the reference is within the field of the inventors' endeavor. The second is whether the reference is reasonably pertinent to the particular problem that the inventors were trying to solve. *In re Clay*, 23 U.S.P.Q.2d 1058 (Fed. Cir. 1992); *In re Wood*, 202 U.S.P.Q. 171, 174 (C.C.P.A. 1979); *In re Deminski*, 230 U.S.P.Q. 313, 315 (Fed. Cir. 1986). In this case, the differences of the three references are summarized in the table below.

Comparison of Features	**Yoshida et al.**	**Sanders et al.**	**Vella**
Type of apparatus	Semiconductor processing chamber	Plasma arc torch	Double chamber ion implantation system
Nozzle usage	To introduce process gas into the chamber	To produce a pilot arc to electrode to initiate a plasma arc	N/A
Shield function	To shield the nozzle from heat	To block splattered molten metal from reaching the nozzle	To reduce the temperature of the wall between charge exchange chamber and plasma generating chamber
Gap characteristics	To provide a space between the heat shield and the nozzle	To define a gas flow passage which allows gas flow to cool the shield to a degree that inhibits the adherence of ejected molten metal	N/A

Applicants' invention relates to a heat shield for a nozzle used to introduce process gas into a semiconductor processing chamber. Yoshida et al. discloses a heat shield for a nozzle for a semiconductor processing chamber, but fails to teach that a gap between the heat shield and the nozzle is smaller than a thickness of the heat shield.

In contrast, Sanders et al. is directed to a plasma arc torch. The nozzle is used to produce a pilot arc to electrode to initiate a plasma arc, and the nozzle shield is used to block splattered molten metal from reaching the nozzle. The gap defines a gas flow passage which allows gas flow to cool the shield to a degree that inhibits the adherence of ejected molten metal. The plasma arc torch of Sanders et al. is outside the inventors' field of endeavor. Moreover, the usage of the nozzle shield to block splattered molten metal and the gap to allow gas flow to cool the shield is not reasonably pertinent to the particular problem that the inventors were trying to solve, namely, to shield the nozzle extending into the chamber from heat.

Furthermore, Vella discloses a double chamber ion implantation system in which a shield is provided to reduce the temperature of the wall between charge exchange chamber and plasma generating chamber. Vella is not directed to a shield for a nozzle. Clearly, Vella is outside the inventors' field of endeavor and its heat shield between two chambers is not reasonably pertinent to the particular problem that the inventors were trying to solve.

The design of the heat shield disclosed by Yoshida et al. is disadvantageous in that it occupies a larger volume within the limited confines of a semiconductor processing chamber, which can impede the processing of substrates due to spatial limitations. Furthermore, the larger volume occupied by the heat shield disclosed by Yoshida et al. causes poor heat dispersion by the heat shield in that the shield is closer to the substrate and the plasma formed within the chamber. Clearly, these are not problems addressed in Sanders et al. and Vella, and the presently claimed heat shield and gap are not features contemplated in Sanders et al. and Vella.

A person of ordinary skill in the art would not have expected the design of a plasma arc torch or a double chamber ion implantation system to have any bearing on the design

of a heat shield for a nozzle for introducing a process gas into a semiconductor processing chamber. Therefore, Sanders et al. and Vella are not analogous to the problem Applicants sought to solve and cannot be properly relied upon in sustaining an obviousness rejection. The combination of elements from nonanalogous sources, in a manner that reconstructs Applicants' invention only with the benefit of hindsight, is insufficient to present a prima facie case of obviousness. *In re Clay*, 23 U.S.P.Q.2d 1058 (Fed. Cir. 1992).

For at least the foregoing reasons, independent claim 1, and claims 4, 5, and 8 depending therefrom, are patentable over Yoshida et al., Sanders et al., and Vella.

Applicant respectfully asserts that independent claim 9 is patentable over Yoshida et al., Sanders et al., and Vella because, for instance, they do not teach or suggest a heat shield for shielding a nozzle extending into a chamber to introduce a process gas into the chamber through a nozzle opening, wherein the heat shield includes a hollow member being spaced from the nozzle by a gap which is smaller than a thickness of the hollow member.

As described above, the head shield of Yoshida et al. is disposed so that the gap between the heat shield and the nozzle is significantly larger than the thickness of the heat shield. Sanders et al. and Vella are not analogous art and thus cannot be combined with Yoshida et al. to sustain an obviousness rejection.

For at least the foregoing reasons, independent claim 9, and claims 10 and 12 depending therefrom, are patentable over Yoshida et al., Sanders et al., and Vella.

Claims 2, 3, and 11

Dependent claims 2, 3, and 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yoshida et al., Sanders et al., and Vella, and further in view of Japanese patent application Pub. No. 09-134880 A (Tsukune). The Examiner recognizes that Yoshida et al., Sanders et al., and Vella do not teach the material of the heat shield, and cites Tsukune for allegedly disclosing the missing feature.

Tsukune does not cure the deficiencies of Yoshida et al., Sanders et al., and Vella, in that it also fails to teach or suggest that the gap between the heat shield or hollow member and the nozzle is significantly larger than the thickness of the heat shield or hollow member, as recited in independent claim 1 and claim 9, from which claims 2-3 and claim 11 depend, respectively.

For at least the foregoing reasons, claims 2, 3, and 11 are patentable.

Claims 6 and 7

Dependent claims 6 and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yoshida et al., Sanders, and Vella, and further in view of Narwankar et al. (US 6,200,911). The Examiner acknowledges that Yoshida et al. does not teach a plurality of nozzles, and cites Narwankar et al. for allegedly disclosing the missing feature.

Narwankar et al. does not cure the deficiencies of Yoshida et al., Sanders et al., and Vella, in that it also fails to teach or suggest that the gap between the heat shield and the nozzle is significantly larger than the thickness of the heat shield, as recited in independent claim 1 from which claims 6 and 7 depend.

For at least the foregoing reasons, claims 6 and 7 are patentable.

Claims 21-24

Dependent claims 21-24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yoshida et al., Sanders, and Vella, and further in view of Whittaker (US 6,755,355).

Claims 21-24 depend from independent claims 1 and 9, respectively, and are submitted to be patentable as being directed to additional features of the invention, as well as by being dependent from allowable claims 1 and 9. Claim 21 and 23 recite that the heat shield is formed integrally with the nozzle. Claim 22 and 24 recite that the heat shield is coupled with the

nozzle by a threaded connection. The Examiner cites Whittaker for allegedly disclosing the threaded connection.

Whittaker does not cure the deficiencies of Yoshida et al., Sanders et al., and Vella, in that it also fails to teach or suggest that the gap between the heat shield or hollow member and the nozzle is significantly larger than the thickness of the heat shield or hollow member, as recited in independent claim 1 and claim 9, from which claims 21-22 and 23-24 depend, respectively.

For at least the foregoing reasons, claims 21-24 are patentable.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

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